

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Triplett

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For: Method and Apparatus for Production
Of Tubing

Examiner: Joseph S. Leyson

Group A.U.: 1722

Mail Stop Non-Fee Amendment

Commissioner for Patents

P. O. Box 1450

Alexandria, Virginia 22313-1450

AMENDMENT AND RESPONSE

Dear Sir:

The Applicant has received the Office Action dated June 4, 2003. Amendments to the claims are provided herewith on the version entitled ***** VERSION SHOWING CHANGES MADE*****.

***** VERSION SHOWING CHANGES MADE*****

METHOD AND APPARATUS FOR PRODUCTION OF TUBING

BACKGROUND OF THE INVENTION

This application claims the benefit of U.S. Provisional Application No. 60/152,877

5 filed September 8, 1999.

The present invention relates generally to production of thermoplastic tubing and formable plastic products and, more particularly, relates to a method and apparatus for producing small and large diameter thermoplastic tubing and composite tubing structures.

DESCRIPTION OF RELATED ART

10 One known method for manufacturing corrugated pipes is to extrude a tube of thermoplastic from a head and then conform that tube to the interior of a corrugated mold tunnel formed by mold blocks. Mold blocks typically come in pairs and mate together to form a portion of the mold tunnel, and the thermoplastic is either blown into shape (by pressure created within the plastic tunnel) or vacuumed into shape (where vacuum draws the air from around the mold tunnel). Typically, the mold blocks operate in
15 a clam shell-type fashion such that each of the mold block pairs pivot on an axis into mating engagement with one another. Examples of clam shell type corrugators are shown in U.S. Pat. Nos. 5,645,871; 5,494,430; 4,439,130 and others. The clam shell-type shape of mold blocks are susceptible to "sawtooth" imperfections which can occur throughout the mold tunnel. Sawtoothing occurs when successive mold blocks are tilted slightly rather than perfectly aligned with the axis of the mold tunnel. The hinged mold

***** VERSION SHOWING CHANGES MADE *****

1. (Currently Amended) A machine cooperable with an extruder to continuously mold an extrudable material comprising:
 - a [continuos] continuous trackway;
 - a frame supporting the trackway;
 - a plurality of separate mold block assemblies restrained to travel about said trackway in succession; and
 - at least one pair of mold block halves connected to each of said plurality of mold block assemblies, said mold block halves linearly displaceable from one another and capable of mating engagement to form a mold tunnel.
2. (Original) The machine of claim 1 further comprising a linear motor drive system having at least one stator located proximate to the trackway and at least one rotor element connected to at least one of said plurality of mold block assemblies.
3. (Original) The machine of claim 1 wherein each the mold block assemblies further comprise a carriage, a guide, and mold block holders, said holders connected to opposing halves of said at least one pair of mold block halves, said carriage restrained to travel substantially about said continuous path, and said guide operatively connecting the holders to the carriage while allowing linear reciprocating movement of the holders relative to the carriage.

4. (Original) The machine of claim 3 further comprising a bearing coupling the mold block holder to the guide.
5. (Original) The machine of claim 4 wherein the bearing is a linear bearing.
6. (Original) The machine of claim 2 further comprising a control device for controlling the speed of the carriages along a portion of the continuous path.
7. (Original) The machine of claim 6 wherein the control device comprises a programmable logic control device.
8. (Original) The machine of claim 6 wherein the control device provides at least one signal to the linear motors operating on at least two of said plurality of carriages to propel the two carriages at different speeds.
9. (Original) The machine of claim 1 further comprising a plurality of raceways adapted to contact a director, said director connected to at least one of said mold block halves, said raceways locating said mold block halves relative to one another.
10. (Original) The machine of claim 3 further comprising a plurality of raceways and at least one director, said raceways locating said mold block halves relative to one another, and said director connected to at least one of the holders.

11. (Original) The machine of claim 1 wherein the continuous trackway is substantially oval shaped.
12. (Original) The machine of claim 1 wherein the frame is modularly constructed and comprised of a first section and a second section connected at an interface, and said first and second sections having first and second portions of said trackway.
13. (Original) The machine of claim 1 wherein the plurality of mold block assemblies substantially abut one another about the continuous path.
14. (Original) The machine of claim 1 further comprising a drive rod mechanically adapted to engage at least one of the mold block assemblies at a location about the continuous path to move the assemblies about the continuous path.
15. (Original) The machine of claim 1 wherein the frame sits upon rollers and the frame is moveable between at least two positions.
16. (Original) A machine cooperable with an extruder to continuously mold a product comprising:
a continuous path;

a plurality of mold block assemblies restrained to travel about said continuous path, each of said mold block assemblies having a carriage moveable about said path and at least one pair of mold block halves mounted upon each of the carriages, said mold blocks halves oriented to oppose one another, and being linearly displaceable relative to one another, and capable of mating engagement with one another along a molding section of the machine to form a mold tunnel within which the product may be molded.

17. (Original) The machine of claim 16 wherein the continuous loop is substantially oval shaped.
18. (Original) The machine of claim 16 having at least two molding sections.
19. (Original) The machine of claim 16 further comprising at least one cooling nozzle directing compressed air towards at least one of the mold block halves.
20. (Currently Amended) The [claim] machine of claim 19 whereby said cooling nozzle is a cooling vortex nozzle.
21. (Original) The machine of claim 16 further comprising a cooling system having a mister and a vent, said mister directing a liquid to deposit on a surface portion of at least one of the mold block halves of at least one of the mold block assemblies,

said vent adapted to assist in evaporating at least some of the liquid deposited on said surface portion of the at least one mold block half.

22. (Original) The machine of claim 21 wherein the vent is coupled to a blower.
23. (Currently Amended) The machine of claim 21 wherein said liquid is at a temperature above room temperature prior to directing towards the mold block half.
24. (Original) The machine of claim 21 wherein the vent is spaced apart from the mold block halves.
25. (Original) The machine of claim 16 wherein the carriage is coupled to rollers restricted by a trackway to operate in the continuous loop.
26. (Currently Amended) The [mold block assembly] machine of claim 25 wherein the rollers at least assist in carrying the weight of the mold block assembly.
27. (Currently Amended) The [mold block assembly] machine of claim 26 further comprising a director connected to at least one of the holders and said director adapted to cooperate with a raceway of the machine to locate a given pair of mold blocks relative to one another.

28. (Currently Amended) A cooling system [for use] in combination with an extruder and a plurality of mold block halves, said system comprising:
a mister directing a liquid to deposit on a surface portion of at least one of the mold block halves; and
a vent adapted to assist in evaporating at least some of the liquid deposited on said surface portion of the at least one mold block half.
29. (Currently Amended) A mold block assembly [for use with] in combination with an extruder and a machine with plurality of [pairs of mold block halves] mold block assemblies operated in a continuous loop along a track, said track having at least two curved segments, each of said mold block [assembly] assemblies following the track and an adjacent mold block assembly, each of said mold block assemblies comprising:
a carriage, a guide, and a first and a second mold block holder, said first holder connected to a first half of a mold block pair, said second holder connected to a second half of the mold block pair, and said guide operatively linking the first and second holders to the carriage and allowing linear displacement of the first and second mold block halves relative to one another.
30. (Original) The mold block assembly of claim 29 further comprising an adapter connected to said first holder and said first mold block.

31. (Original) The mold block assembly of claim 30 further comprising a release lever, said release lever having a first position connecting the adapter to the first holder and a second position releasing at least a portion of said adapter from said first holder.
32. (Original) The mold block assembly of claim 29 further comprising a coupling connecting to the first and second holders, wherein movement of the first holder relative to the carrier in a direction moves the second holder relative to the carrier.
33. (Original) The mold block assembly of claim 32 wherein the coupling further comprises a sprocket rotatable relative to and connected to the carrier, and a chain connected to the first and second holders, said chain contacting the sprocket wherein movement of the first holder relative to the carrier moves the chain and the second holder.
34. (Original) The mold block assembly of claim 32 wherein movement of the first holder towards a center portion of the carrier moves the second holder toward the center of the carrier.
35. (Original) The mold block assembly of claim 29 wherein the holders are adapted to receive at least two different sized mold block halves.

36. (Original) The mold block assembly of claim 29 wherein the first and second holders are connected to at least two halves of two mold block pairs.
37. (Original) A method for producing an extruded product utilizing a machine having a continuous trackway configured in a continuous path, a frame supporting the trackway, a plurality of separate mold block assemblies restrained to travel about said trackway; and at least one pair of mold block halves connected to each of said plurality of mold block assemblies, said mold block halves linearly displaceable from one another and capable of mating engagement to form a mold tunnel therein, said method comprising the steps of:
- forming a mold tunnel along a portion of said continuous path;
 - extruding an extrudable material within the mold tunnel; and
 - linearly displacing mold block halves at an end of the mold tunnel to allow the extruded product to be removed from the machine.
38. (Original) The method of claim 37 further comprising the step of cooling the mold block halves after removing the extruded product from the machine.